REMARKS

I. The Invention

The present invention relates to the cloning and characterization of a *Fucus* vanadium peroxidase. The present inventors identified for the first time the full-length polynucleotide sequence as well as the amino acid sequence of the enzyme. Furthermore, the inventors discovered that the N-terminus of this enzyme is not necessary for its activity. As examples, two N-terminally truncated enzymes have been recombinantly produced and shown to possess enzymatic activity.

II. Status of the Claims

Claims 1-30 were originally filed. Claims 1-15 and 17-19 have been canceled. Claims 16 and 20-30 are currently pending.

III. Claim Rejection

35 U.S.C. §112, First Paragraph: Enablement

The Examiner maintained the rejection of claims 16 and 20-30 under 35 U.S.C. §112, first paragraph, for alleged inadequate enablement. Indicating that Applicants' argument in the last response failed to overcome the enablement rejection, the Examiner cited the following specific reasons: first, the 441-676 fragment of SEQ ID NO:2 has not been shown to have vanadium peroxidase activity; and second, the three recombinant vanadium peroxidase polypeptides in Table 1 are not within the scope of the pending claims because these recombinant polypeptides correspond to amino acids 1-600, 60-600, and 236-600 of SEQ ID NO:2 and therefore do not contain the 441-676 fragment of SEQ ID NO:2. Applicants respectfully traverse the rejection.

With regard to the Examiner's concern that the 441-676 fragment of SEQ ID NO:2 has not been shown to possess vanadium peroxidase activity, whether this fragment alone is sufficient to support vanadium peroxidase activity is irrelevant to the enablement of the

pending claims. The pending claims are drawn to an isolated polypeptide comprising the 441-676 subsequence of SEQ ID NO:2 and, among other things, has a molecule weight of between about 40 to about 60 kDa. Based on the art-recognized molecular weight estimate of about 110 Dalton per amino acid, a polypeptide consisting of the 441-676 fragment of SEQ ID NO:2 would have a theoretical molecular weight of about 26 kDa. As such, a polypeptide consisting of the 441-676 fragment of SEQ ID NO:2 is not included in the claim scope.

With regard to the Examiner's assertion that the three recombinant polypeptides in Table 1 do not comprise the 441-676 fragment of SEQ ID NO:2, Applicants contend that the Examiner's interpretation of the experimental data in Table 1 is inconsistent with the description of these experiments in the specification.

The three recombinant polypeptides of Table 1 include the full-length *Fucus* bromoperoxidase (rVPx1) and two 5' (or N-terminus) truncated forms (rVPx2 and rVPx3), corresponding to100%, 80%, and 54% of the full-length sequence (see page 19, lines 1-3, of the specification). According to the specification, these three polypeptides were produced to confirm the location of the active site of the enzyme at the 3' end (or C-terminus) (page 18, lines 31-31).

One of skill in the art would immediately recognize, upon reading the above descriptions of the recombinant *Fucus* vanadium peroxidase polypeptides in Table 1 in view of the schematic depiction of the recombinant proteins (page 23, lines 26-27; Figure 1), that the starting points in bp in column 2 of Table 1 refer to the coding sequence within SEQ ID NO:1 instead of SEQ ID NO:1, which includes a 227 bp 5' UTR upstream from the coding sequence (see page 21, line 31, to page 22, line 2, of the specification).

For instance, based on the length of vanadium peroxidase polynucleotide sequence (2028 bp) included in the construct for generating a full length recombinant *Fucus* vanadium peroxidase (rVPx1), a skilled artisan would immediately recognize that starting point in Table 1 in fact refers to the coding sequence within SEQ ID NO:1, because a 3' (or C-

terminus) truncated vanadium peroxidase, instead of a full-length enzyme, would be generated if the starting point were in reference to SEQ ID NO:1.

Similarly, an artisan would also immediately recognize that the starting points for rVPx2 and rVPx3 in Table 1 in fact refer to the coding sequence within SEQ ID NO:1, because two 3' (or C-teminus) truncated vanadium peroxidase polypeptides would be generated if the starting points in bp numbers were in reference to SEQ ID NO:1.

Recombinant polypeptides corresponding to amino acids 1-600, 60-600, and 236-600 of SEQ ID NO:2, would be inconsistent with the description (one full-length and two 5' truncated vanadium peroxidase polypeptides) and the stated purpose of making these proteins (to confirm the location of the active site at the 3' end) in the specification. Thus, based on the description in the specification of the experimental results summarized in Table 1, an artisan would immediately recognize that the starting points in bp in reference to SEQ ID NO:1 in Table 1 in fact refer to the coding sequence within SEQ ID NO:1.

As such, Applicants submit that three recombinant polypeptides: rVPx 1, rVPx2, and rVPx3, have been shown to possess vanadium peroxidase activity (see description on page 24, lines 7-11, of the specification). Among the three polypeptides, rVPx1 is the full-length polypeptide having the amino acid sequence of SEQ ID NO:2 with a molecular weight of about 74 kDa, rVPx2 is the 137-676 segment of SEQ ID NO:2 with a molecular weight of about 40 kDa, and rVPx3 is the 313-676 segment of SEQ ID NO:2 with a molecular weight of about 60 kDa. Each of the three comprises the 441-676 segment of SEQ ID NO:2. Only rVPx2 and rVPx3 are within the scope of pending claims.

Since the Examiner's specific concerns regarding Applicants' enablement argument have been addressed, Applicants respectfully request that the enablement rejection be properly withdrawn.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance and an action to that end is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 415-576-0200.

Respectfully submitted,

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